WEST DUNNE AVENUE WIDENING PROJECT ENVIRONMENTAL NOISE ASSESSMENT MORGAN HILL, CALIFORNIA

July 24, 2009

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INTRODUCTION

This report summarizes the results of the environmental noise assessment completed for the West Dunne Avenue Widening Project in Morgan Hill, California. The project would widen West Dunne Avenue between Monterey Street and Peak Avenue to meet current roadway design standards and to allow for a center turn lane, bike lanes, on street parking, and the construction of curb, gutter, and sidewalk. No additional travel lanes are proposed as part of the project.

The report is divided into two sections. The Setting Section provides a brief description of the fundamentals of environmental noise, summarizes applicable regulatory criteria established by the City of Morgan Hill, and discusses the results of the ambient noise monitoring survey completed to document existing noise conditions. The Impacts and Mitigation Measures Section of the report describes the significance criteria used in the analysis and provides an evaluation of temporary vibration and noise resulting from project construction activities and permanent noise level increases resulting from the widening of the roadway.

SETTING

Fundamentals of Environmental Noise

Noise may be defined as unwanted sound. Noise is usually objectionable because it is disturbing or annoying. The objectionable nature of sound could be caused by its *pitch* or its loudness. *Pitch* is the height or depth of a tone or sound, depending on the relative rapidity (frequency) of the vibrations by which it is produced. Higher pitched signals sound louder to humans than sounds with a lower pitch. *Loudness* is intensity of sound waves combined with the reception characteristics of the ear. Intensity may be compared with the height of an ocean wave in that it is a measure of the amplitude of the sound wave.

In addition to the concepts of pitch and loudness, there are several noise measurement scales which are used to describe noise in a particular location. *A decibel (dB)* is a unit of measurement which indicates the relative amplitude of a sound. The zero on the decibel scale is based on the lowest sound level that the healthy, unimpaired human ear can detect. Sound levels in decibels are calculated on a logarithmic basis. An increase of 10 decibels represents a ten-fold increase in acoustic energy, while 20 decibels is 100 times more intense, 30 decibels is 1,000 times more intense, etc. There is a relationship between the subjective noisiness or loudness of a sound and its intensity. Each 10 decibel increase in sound level is perceived as approximately a doubling of loudness over a fairly wide range of intensities. Technical terms are defined in Table 1.

There are several methods of characterizing sound. The most common in California is the *A-weighted sound level or dBA.* This scale gives greater weight to the frequencies of sound to which the human ear is most sensitive. Representative outdoor and indoor noise levels in units of dBA are shown in Table 2. Because sound levels can vary markedly over a short period of time, a method for describing either the average character of the sound or the statistical behavior of the variations must be utilized. Most commonly, environmental sounds are described in terms of an average level that has the same acoustical energy as the summation of all the time-varying events. This energy-equivalent sound/noise descriptor is called L_{eq}. The most common averaging period is hourly, but L_{eq} can describe any series of noise events of arbitrary duration. The scientific instrument used to measure noise is the sound level meter. Sound level meters can accurately measure environmental noise levels to within about plus or minus 1 dBA. Various computer models are used to predict environmental noise levels from sources, such as roadways and airports. The accuracy of the predicted models depends upon the distance the receptor is from the noise source. Close to the noise source, the models are accurate to within about plus or minus 1 to 2 dBA.

Since the sensitivity to noise increases during the evening and at night -- because excessive noise interferes with the ability to sleep -- 24-hour descriptors have been developed that incorporate artificial noise penalties added to quiet-time noise events. The *Community Noise Equivalent Level, CNEL,* is a measure of the cumulative noise exposure in a community, with a 5 dB penalty added to evening (7:00 pm - 10:00 pm) and a 10 dB addition to nocturnal (10:00 pm - 7:00 am) noise levels. The *Day/Night Average Sound Level, L_{dn}*, is essentially the same as CNEL, with the exception that the evening time period is dropped and all occurrences during this three-hour period are grouped into the daytime period.

Fundamentals of Groundborne Vibration

Ground vibration consists of rapidly fluctuating motions or waves with an average motion of zero. Several different methods are typically used to quantify vibration amplitude. One is the Peak Particle Velocity (PPV) and another is the Root Mean Square (RMS) velocity. The PPV is defined as the maximum instantaneous positive or negative peak of the vibration wave. The RMS velocity is defined as the average of the squared amplitude of the signal. The PPV and RMS vibration velocity amplitudes are used to evaluate human response to vibration. In this section, a PPV descriptor with units of mm/sec. or in/sec. is used to evaluate construction generated vibration for building damage and human complaints. Table 3 displays the reactions of people and the effects on buildings that continuous vibration levels produce. The annoyance levels shown in Table 3 should be interpreted with care since vibration may be found to be annoying at much lower levels than those shown, depending on the level of activity or the sensitivity of the individual. To sensitive individuals, vibrations approaching the threshold of perception can be annoying.

Low-level vibrations frequently cause irritating secondary vibration, such as a slight rattling of windows, doors or stacked dishes. The rattling sound can give rise to exaggerated vibration complaints, even though there is very little risk of actual structural damage. In high noise environments, which are more prevalent where groundborne vibration approaches perceptible levels, this rattling phenomenon may also be produced by loud airborne environmental noise causing induced vibration in exterior doors and windows.

TABLE 1 Definitions of Acoustical Terms Used in this Report

Term	Definition
Decibel, dB	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure. The reference pressure for air is 20.
Sound Pressure Level	Sound pressure is the sound force per unit area, usually expressed in micro Pascals (or 20 micro Newtons per square meter), where 1 Pascal is the pressure resulting from a force of 1 Newton exerted over an area of 1 square meter. The sound pressure level is expressed in decibels as 20 times the logarithm to the base 10 of the ratio between the pressures exerted by the sound to a reference sound pressure (e.g., 20 micro Pascals). Sound pressure level is the quantity that is directly measured by a sound level meter.
Frequency, Hz	The number of complete pressure fluctuations per second above and below atmospheric pressure. Normal human hearing is between 20 Hz and 20,000 Hz. Infrasonic sound are below 20 Hz and Ultrasonic sounds are above 20,000 Hz.
A-Weighted Sound Level, dBA	The sound pressure level in decibels as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise.
Equivalent Noise Level, L_{eq}	The average A-weighted noise level during the measurement period.
Day-Night Level, L_{dn}	L_{dn} is the equivalent noise level for a continuous 24-hour period with a 10-decibel penalty imposed during nighttime and morning hours (10:00 pm to 7:00 am).
Community Noise Exposure Level, CNEL	CNEL is the equivalent noise level for a continuous 24-hour period with a 5-decibel penalty imposed in the evening (7:00 pm to 10:00 pm) and a 10-decibel penalty imposed during nighttime and morning hours (10:00 pm to 7:00 am)
L_1, L_{10}, L_{50}, L_{90}	The A-weighted noise levels that are exceeded 1%, 10%, 50%, and 90% of the time during the measurement period.
Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
Intrusive	That noise which intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level.

TABLE 2 Typical Noise Levels in the Environment

Common Outdoor Noise Source	Noise Level (dBA)	Common Indoor Noise Source
	120 dBA	
Jet fly-over at 1000 feet		Rock concert
	110 dBA	
Pile driver at 70 feet	100 dBA	
		Night club with live music
	90 dBA	
Large truck pass by at 50 feet		
	80 dBA	Noisy restaurant
		Garbage disposal at 3 feet
Gas lawn mower at 100 feet	70 dBA	Vacuum cleaner at 10 feet
Commercial/Urban area daytime		Normal speech at 3 feet
Suburban expressway at 300 feet	60 dBA	
Suburban daytime		Active office environment
	50 dBA	
Urban area nighttime		Quiet office environment
	40 dBA	
Suburban nighttime		
Quiet rural areas	30 dBA	Library
		Quiet bedroom at night
Wilderness area	20 dBA	Quiet recording studio
	10 dBA	
Threshold of human hearing	0 dBA	Threshold of human hearing

TABLE 3 Reaction of People and Damage to Buildings for Continuous Vibration Levels[1]

Velocity Level, PPV (in/sec)	Human Reaction	Effect on Buildings
0.006 to 0.019	Threshold of perception, Possibility of intrusion	Vibration unlikely to cause damage of any type
0.08	Vibrations readily perceptible	Recommended upper level of the vibration to which ruins and ancient monuments should be subjected
0.10	Level at which continuous vibrations begin to annoy people	Virtually no risk of “architectural” damage to normal buildings
0.20	Vibrations annoying to people in buildings	Threshold at which there is a risk of “architectural” damage to normal dwellings such as plastered walls or ceilings.
0.4 to 0.6	Vibrations considered unpleasant by people subjected to continuous vibrations	Vibration at this level would cause “architectural” damage and possibly minor structural damage.

1 A Survey of Traffic Induced Vibrations, Whiffen and Leonard, Transport and Road Research Laboratory, RRL Report LR418, Crowthorne, Berkshire, England, 1971.

Regulatory Background

The State of California and the City of Morgan Hill establish regulatory criteria that are applicable in this noise impact assessment. The State's CEQA guidelines are used to assess the potential significance of environmental noise impacts pursuant to local policies set forth in the City of Morgan Hill General Plan and Municipal Code.

State CEQA Guidelines. The California Environmental Quality Act (CEQA) contains guidelines to evaluate the significance of environmental noise impacts attributable to a proposed project. Applicable CEQA checklist questions[2] ask whether the project would result in:

a) Exposure of persons to or generation of noise levels in excess of standards established in the local General Plan or Noise Ordinance, or applicable standards of other agencies?

b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?

c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?

d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?

Public Health and Safety Element of the City of Morgan Hill General Plan. The Public Health and Safety Element of the General Plan sets forth noise and land use compatibility standards to guide development, and noise goals and policies to protect citizens from the harmful and annoying effects of excessive noise. Goals and policies established in the Noise Element of the General Plan that are applicable to the proposed project include:

Goal 7 Prevention of noise from interfering with human activities or causing health problems.

7e. Noise level increases resulting from traffic associated with new projects shall be considered significant if: a) the noise level increase is 5 dBA L_{dn} or greater, with future noise levels of less than 60 dBA L_{dn}, or b) the noise level increase is 3 dBA L_{dn} or greater, with a future noise level of 60 dBA L_{dn} or greater.

Goal 8 Protection from noise associated with motor vehicles and railroad activity.

8a. Roadway design, traffic signalization and other traffic planning techniques (such as limiting truck traffic in residential areas) shall be used to reduce noise caused by speed or acceleration of vehicles.

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2 CEQA checklist questions e and f, regarding potential impacts from aircraft noise, are not applicable in the assessment and have been omitted. These items are not discussed further.

8b. If noise barriers are deemed the only effective mitigation for development along major transportation corridors, an acoustical analysis shall be conducted to determine necessary dimensions.

Morgan Hill Municipal Code. Chapter 8.28, Section 8.28.040 of the Health and Safety section of the Municipal Code regulates construction noise. Public Works projects are specifically exempted from this section of the code and the public works director shall determine the hours of construction for public works projects.

Existing Noise Environment

Noise-sensitive uses north of West Dunne Avenue include single-family and multi-family residences between Monterey Street and Peak Avenue. Noise-sensitive uses south of West Dunne Avenue include an apartment complex at the southwest quadrant of the West Dunne Avenue/Monterey Street intersection, a commercial shopping center, single-family and multi-family residences, and medical office buildings.

A noise monitoring survey was conducted from March 10, 2009 to March 11, 2009 to quantify the existing noise environment along the project corridor. The noise monitoring survey included two long-term measurements (LT-1 and LT-2), and five short-term measurements (ST-1 through ST-5) as indicated on Figure 1. The noise environment along the project site results primarily from local traffic noise generated along West Dunne Avenue and distant traffic noise from Monterey Street.

Noise measurement location LT-1 was approximately 40 feet from the center of the roadway, in the front yard of 130 West Dunne Avenue. This noise measurement represented the noise environment resulting from traffic along West Dunne Avenue. Hourly average noise levels typically ranged from 62 to 67 dBA L_{eq} during the day, and from 48 to 64 dBA L_{eq} at night. The calculated day-night average noise level at this measurement location was 66 dBA L_{dn}. Noise measurement data collected at this site are summarized on Figure 2.

Long-term noise measurement location LT-2 documented existing ambient noise levels along West Dunne Avenue at the western portion of the project area near Peak Avenue. This noise measurement location represented the noise environment resulting from traffic along West Dunne Avenue and distant traffic along Peak Avenue. Hourly average noise levels typically ranged from 56 to 62 dBA L_{eq} during the day, and from 43 to 59 dBA L_{eq} at night. The calculated day-night average noise level at this measurement location was 61 dBA L_{dn}. Figure 3 summarizes the data collected at site LT-2.

Short-term (ten minute) noise measurements were made at five additional locations within the project area to complete the noise monitoring survey. Short-term noise measurement ST-1 was made approximately 40 feet from the center of West Dunne Avenue. The average noise level during this time period was 65 dBA L_{eq}. Short-term noise measurement ST-2 was made in the backyard of 130 West Dunne Avenue. The average noise level during this time period was 48 dBA L_{eq}. Short-term noise measurement ST-3 was made approximately 65 feet from the center of West Dunne Avenue, adjacent to the medical office buildings. The average noise level during this time period was 60 dBA L_{eq}. Short-term noise measurement ST-4 was made approximately 65 feet from the center of West Dunne Avenue near Viewcrest Lane. The average noise level during this time period was 62 dBA L_{eq}. Short-term noise measurement ST-5 was made approximately 65 feet from the center of West Dunne Avenue, across from the commercial shopping center. The average noise level during this time period was 61 dBA L_{eq}. Table 4 summarizes the results of these measurements.

TABLE 4 Summary of Short-Term Noise Measurement Data

Noise Measurement Location	L_{max}	$L_{(1)}$	$L_{(10)}$	$L_{(50)}$	$L_{(90)}$	L_{eq}	L_{dn}
ST-1: ~40 feet from the center of West Dunne Avenue. (3/10/2009, 1:40-1:50 p.m.)	73	71	69	63	50	65	66
ST-2: Backyard of 130 West Dunne Avenue. (3/10/2009, 1:40-1:50 p.m.)	57	55	51	47	41	48	49
ST-3: ~65 feet from the center of West Dunne Avenue. (3/11/2009, 11:30-11:40 a.m.)	72	69	64	56	45	60	61
ST-4: ~65 feet from the center of West Dunne Avenue. (3/11/2009, 11:50-12:00 p.m.)	71	70	66	59	44	62	64
ST-5: ~ 65 feet from the center of West Dunne Avenue. (3/11/2009, 12:10-12:20 p.m.)	69	68	65	59	52	61	62

Note: L_{dn} approximated by correlating to corresponding period at long-term site.

Figure 1: Noise Measurement Locations and Site Vicinity

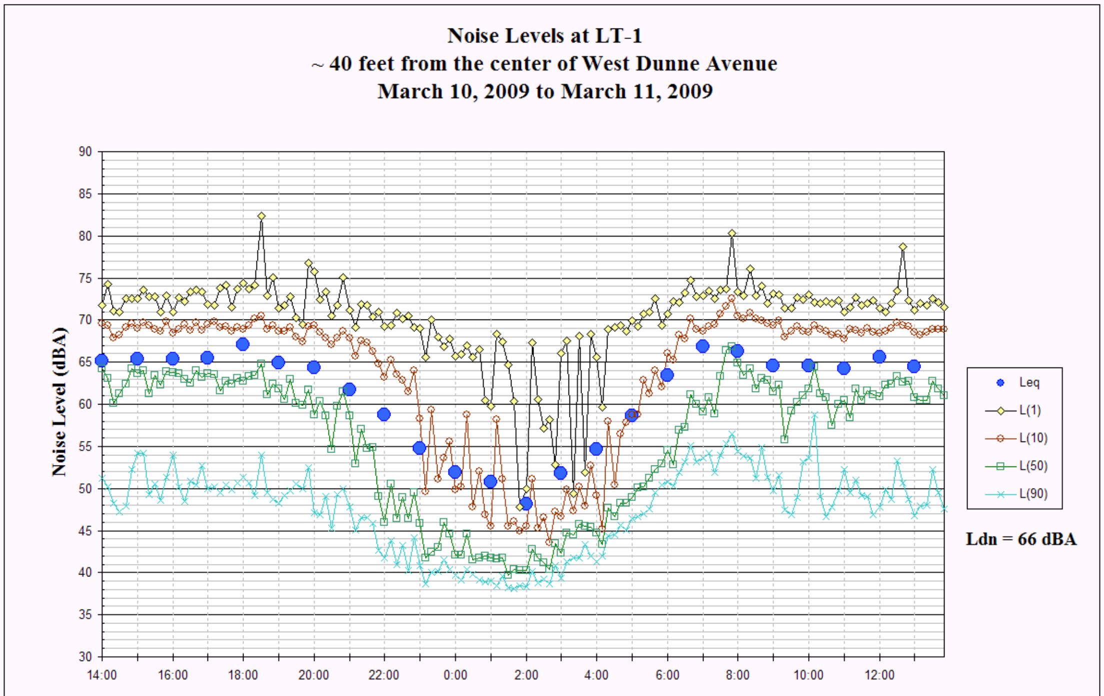


Figure 2

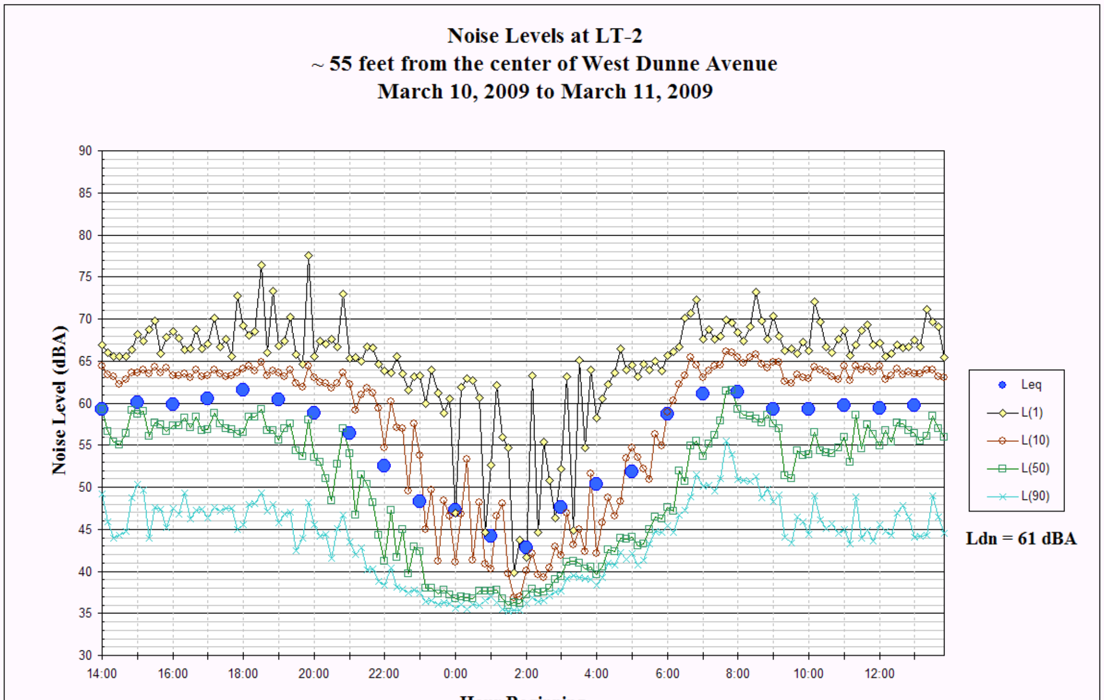


Figure 3

NOISE IMPACTS AND MITIGATION MEASURES

Significance Criteria

Appendix G of the CEQA Guidelines states that a project would normally be considered to result in a significant impact if noise levels conflict with adopted environmental standards or plans, if the project would expose persons to or generate excessive groundborne vibration levels, or if noise levels generated by the project would substantially increase existing noise levels on a permanent or temporary basis. For the purposes of this analysis, the following criteria were used to quantitatively evaluate noise and vibration impacts resulting from the project:

- Groundborne vibration levels exceeding 0.2 in/sec PPV (peak particle velocity) would have the potential to result in "architectural" damage to normal dwellings. Levels exceeding 0.2 in/sec PPV would be considered excessive.

- A substantial permanent noise increase would occur if the noise level increase resulting from the project is 5 dBA L_{dn} or greater in noise environments where noise levels would remain less than 60 dBA L_{dn}, or 3 dBA L_{dn} or greater, with a future noise level of 60 dBA L_{dn} or greater.

- Noise generated by construction of the project would be short-term and vary considerably day-to-day, therefore, construction noise is evaluated somewhat differently than operational noise. When construction activities are predicted to cause prolonged interference with normal activities at noise-sensitive receiver locations and exceed 60 dBA L_{eq} and ambient noise levels by 5 dBA or more, the impact would be considered significant. Prolonged interference is defined as a noise level increase that occurs for more than one year.

Impact 1: **Conflict with Established Standards.** The project would not conflict with local noise standards contained in the General Plan or Noise Ordinance. **This is a less-than-significant impact.**

Applicable goals and policies contained in the City of Morgan Hill General Plan are summarized in the Setting section of this report. General Plan Policy 7e states that noise level increases of 3 dBA L_{dn} or greater shall be considered significant where future noise levels are 60 dBA L_{dn} or greater. Substantial permanent noise level increases attributable to the project are described in detail in Impact 3. The results of the traffic noise modeling completed for this assessment indicate that the project would increase noise levels by 1 dBA L_{dn} or less. The project would not conflict with applicable General Plan policies.

The Municipal Code specifically exempts construction noise resulting from Public Works projects. As such, the project would not conflict with standards presented in the Municipal Code and the impact is less-than-significant.

Mitigation Measures: **None Required.**

Impact 2: **Exposure to Groundborne Vibration.** The proposed project will not result in excessive groundborne vibration at residences in the vicinity, but may generate levels that could result in "architectural" damage when located within 25 feet of sensitive historic structures. **This is a significant impact.**

Construction equipment anticipated during proposed construction activities would include backhoes, excavators, dump trucks, front-end loaders, asphalt pavement grinders, compacting equipment, asphalt pavers, concrete trucks and various passenger vehicles. Construction activities with the greatest potential of generating perceptible vibration levels would include the removal of pavement and soil, the movement of heavy tracked equipment, and vibratory compacting of roadway base materials. Table 5 summarizes typical vibration levels associated with varying pieces of construction equipment at a distance of 25 feet.

TABLE 5 Vibration Source Levels for Construction Equipment[3]

Equipment		PPV at 25 ft. (in/sec)
Pile Driver (Impact)	upper range	1.158
	typical	0.644
Pile Driver (Sonic)	upper range	0.734
	typical	0.170
Clam shovel drop		0.202
Hydromill (slurry wall)	in soil	0.008
	in rock	0.017
Vibratory Roller		0.210
Hoe Ram		0.089
Large bulldozer		0.089
Caisson drilling		0.089
Loaded trucks		0.076
Jackhammer		0.035
Small bulldozer		0.003

A review of the anticipated construction equipment and the vibration level data provided in Table 5 indicates that vibration levels generated by proposed activities and equipment would be equal to or below the 0.2 in/sec PPV criteria when construction occurs at distances of 25 feet or greater from sensitive structures. The construction of the project may at times require heavy equipment or impact tools within 25 feet of sensitive historic structures. Construction activities occurring within 25 feet of sensitive historic structures could generate vibration levels exceeding 0.2. in/sec and result in "architectural" damage, and the impact would be considered significant.

Vibration levels generated by construction activities would be perceptible indoors and may be considered annoying at times. However, residential land uses adjoining the roadway would not likely be subject to excessive vibration levels over extended periods of time given the limited

3 Transit Noise and Vibration Impact Assessment, United States Department of Transportation, Office of Planning and Environment, Federal Transit Administration, May 2006.

work anticipated in close proximity to existing residential buildings. Furthermore, proposed construction hours are during the daytime only thus reducing the potential for residential annoyance during typical periods of rest or sleep.

Mitigation Measure:

- Construction activities or techniques known to generate high vibration levels shall be prohibited within 25 feet of sensitive historic structures. In these areas, alternative construction methods shall be implemented to complete the required tasks (e.g., requiring the use of hand tools rather than impact tools) to avoid "architectural" damage to sensitive historic structures.

Impact 3: **Substantial Permanent Noise Level Increase along West Dunne Avenue.** The project would widen West Dunne Avenue to accommodate a center turn lane, bike lanes, and on street parking. The widening would move the travels lanes slightly closer to noise-sensitive receivers along the project alignment, but noise levels would not be substantially increased. **This is a less-than-significant impact.**

The project would widen West Dunne Avenue between Monterey Street and Peak Avenue to meet current roadway design standards. The project would not add new travel lanes, but would shift the alignments of the existing travel lanes slightly closer to adjacent sensitive land uses.

Traffic noise modeling was conducted to calculate the change in noise levels expected as a result of the shift in lane geometries. Traffic noise levels were modeled with FHWA's Traffic Noise Model (TNM v. 2.5). The traffic noise model was calibrated to measured conditions documented during the noise monitoring survey, and then used to calculate traffic noise levels under the existing, future no project (assumes lane geometries remain unchanged) and future with project scenarios. Per City request, the future with project scenario assumed that West Dunne Avenue, between Monterey Street and Peak Avenue, would have two travel lanes in each direction. This future with project scenario would represent credible worst-case traffic noise levels emanating from the roadway. The results of the modeling are summarized in Table 6.

TABLE 6 Summary of Traffic Noise Modeling Results (dBA, L_{dn})

Receiver	Existing	2030 No Project	No Project Increase Over Existing	2030 With Project	With Project Increase Over Existing
ST-1	66	67	1	67	1
ST-2	49	50	1	50	1
ST-3	61	62	1	62	1
ST-4	64	65	1	66	2
ST-5	62	63	1	64	2

According to significance criteria established for the project, the impact would be considered significant if the project increases noise levels by 3 dBA L_{dn} or more where noise levels would exceed 60 dBA L_{dn}. 2030 No Project traffic noise levels are anticipated to increase by about 1 dBA L_{dn} as a result of increased traffic anticipated along West Dunne Avenue. This traffic noise level increase is expected with or without the project. A comparison of the 2030 No Project and 2030 With Project modeling results indicates that the relative changes made to the lane geometries would result in an additional slight increase in traffic noise levels at existing residences located north and south of West Dunne Avenue. The noise increase resulting from the shift in lane geometries (assuming a 4-lane roadway) would range from 0 to 1 dBA L_{dn} at receivers along the project corridor. Future noise levels with the project would be 1 to 2 dBA L_{dn} higher than existing conditions. The projected noise level increase would not be perceptible and the impact would be less-than-significant.

Mitigation Measures: **None Required**

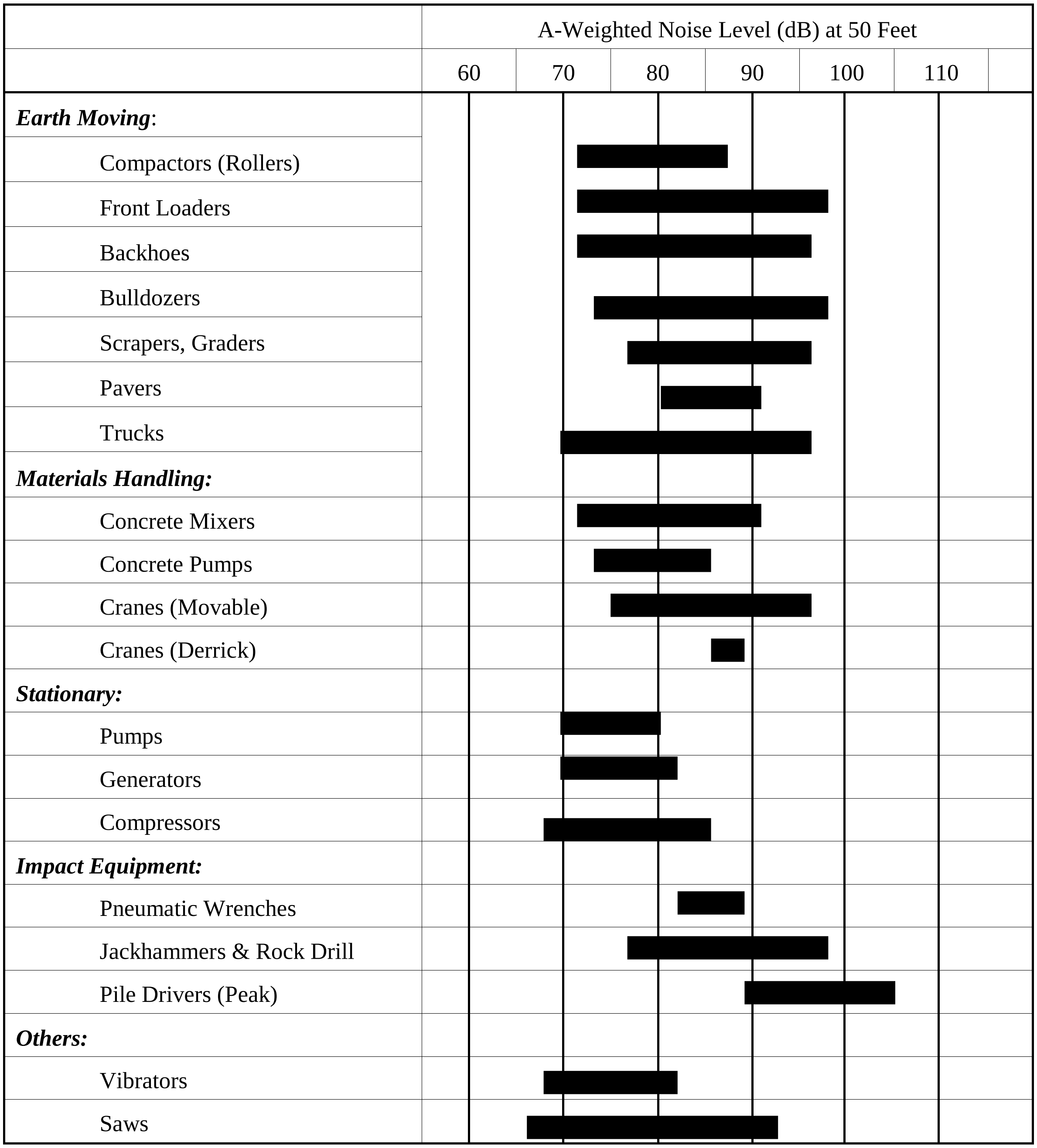
Impact 3: **Construction Noise.** Noise generated by roadway construction activities would not be expected to adversely affect adjacent residential land uses. **This is a less-than-significant impact.**

The construction of the project would generate noise, and would temporarily increase noise levels at adjacent residential receptors. Construction equipment would likely include backhoes, excavators, dump trucks, front-end loaders, asphalt pavement grinders, compacting equipment, asphalt pavers, concrete trucks and various passenger vehicles. Noise impacts resulting from roadway construction depend on the noise generated by various pieces of construction equipment, the timing and duration of noise generating activities, and the distance between construction noise sources and noise sensitive receptors. Construction activities generate considerable amounts of noise, especially when heavy equipment is used. Tables 7 and 8 summarize the range of noise levels generated by individual pieces of construction equipment and typical construction noise levels during specific construction phases, respectively. At times, these activities would occur immediately adjacent to residential receivers. The highest maximum noise levels generated by project construction would typically range from about 90 to 98 dBA at a distance of 50 feet from the noise source. Typical hourly average construction generated noise levels are about 79 dBA to 88 dBA measured at a distance of 50 feet from the center of the site during busy construction periods. Interior noise levels would be as high as 68 dBA inside (assuming the windows are shut). The noise levels would be high enough to interfere with conversation in the rooms facing the road. During other phases of construction, noise levels would be lower but could still potentially interfere with indoor and outdoor activities. Construction generated noise levels drop off at a rate of about 6 dBA per doubling of distance between the source and receptor. Shielding provided by buildings or terrain result in lower construction noise levels at distant receptors. Construction noise levels would at times exceed 60 dBA L_{eq} and the ambient by at least 5 dBA L_{eq} at nearby receivers, however, this period of time would be relatively short as construction activities move along the right-of-way as the project proceeds.

Noise impacts resulting from construction activities depend on the noise levels generated by various pieces of construction equipment relative to ambient noise conditions, the timing and duration of noise generating activities, and the distance between construction noise sources and noise sensitive receptors. Construction noise impacts often occur when construction activities take place during noise-sensitive times of the day (early morning, evening, or nighttime hours), when construction activities occur immediately adjacent to noise sensitive land uses, or when construction durations last over extended periods of time. Limiting construction activities to daytime hours is often a simple method to reduce the potential for construction noise impacts. In areas immediately adjacent to construction activities, temporary noise barriers and the selection and utilization of "quiet" construction equipment can also reduce the potential for significant noise impacts.

Construction of the planned roadway improvements would result in temporary noise level increases at sensitive receivers along the alignment of those improvements. This is a less-than-significant impact given the duration of time that particular noise-sensitive receivers would be affected by project-related construction activities because activities would generally move along the right-of-way as construction proceeds. The construction of the roadway improvements would not be expected to generate noise levels exceeding 60 dBA L_{eq} and the ambient noise environment by 5 dBA L_{eq} or more at a particular receiver for a period exceeding one year.

Mitigation Measures: **None Required**



Source: Handbook of Noise Control, Cyril M. Harris, 1979

Construction Equipment Noise Level Range	TABLE 7

TABLE 8 Typical Ranges of Noise Levels at 50 Feet from Construction Sites (dBA L_{eq})

	Domestic Housing		Office Building, Hotel, Hospital, School, Public Works		Industrial Parking Garage, Religious Amusement & Recreations, Store, Service Station		Public Works Roads & Highways, Sewers, and Trenches	
	I	II	I	II	I	II	I	II
Ground Clearing	83	83	84	84	84	83	84	84
Excavation	88	75	89	79	89	71	88	78
Foundations	81	81	78	78	77	77	88	88
Erection	81	65	87	75	84	72	79	78
Finishing	88	72	89	75	89	74	84	84

I - All pertinent equipment present at site.
II - Minimum required equipment present at site.
Source: United States Environmental Protection Agency, 1973, Legal Compilation on Noise, Vol. 1, p. 2-104.